AFRL – Towards the Next Horizon

Dr William U. Borger
Director, Plans and Programs
Air Force Research Laboratory

Agenda

- AFRL – Who We Are
- S&T Budget
- Principles and Vision
- S&T Program Drivers
- Future Directions

Air Force Research Laboratory Technology Directorates

Commander (CC)

Executive Director (CD)

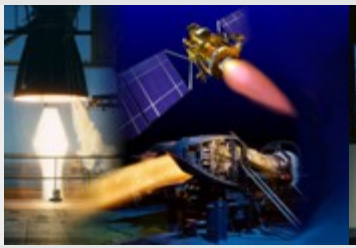
Vice Commander (CV)

Chief Technologist (CT)

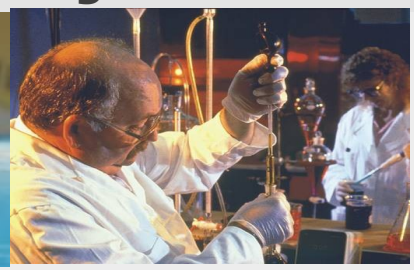
Staff

Plans and Programs (XP)

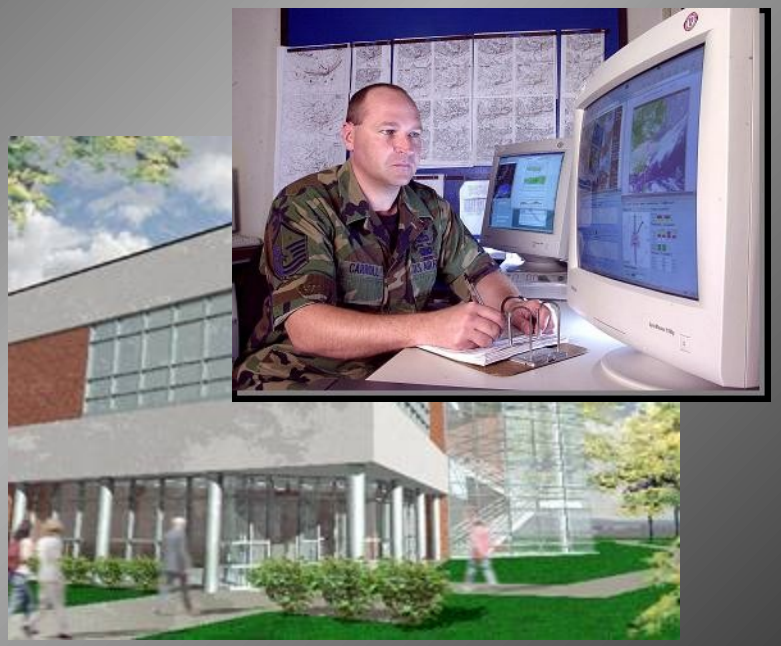
Propulsion & Power | Information | Munitions | Air Vehicles | Space Vehicle



Directed Energy | Sensors | Human Effectiveness | Materials & Mfg | AFOSR



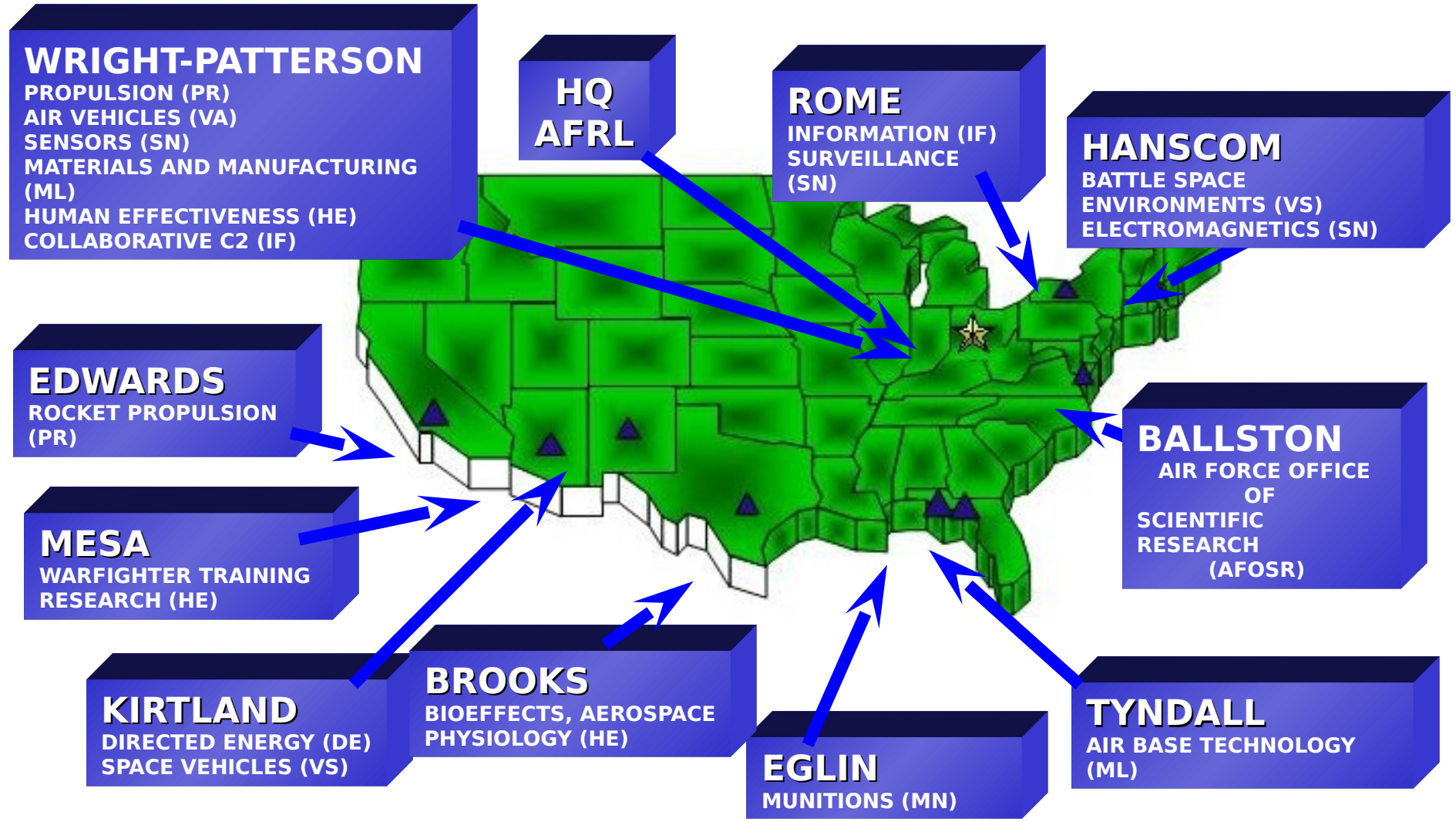
AFRL People & Facilities



- 5343 Government Employees
- 3798 Onsite Contractors

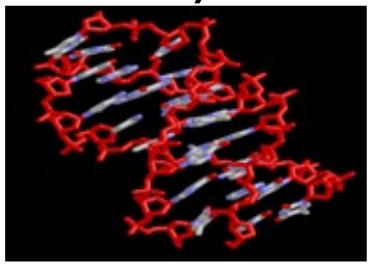
- 10 Major R&D Sites across US
- Real Property Replacement Value = $1.8B
- Equipment Property Replacement Value =

AFRL Major Sites



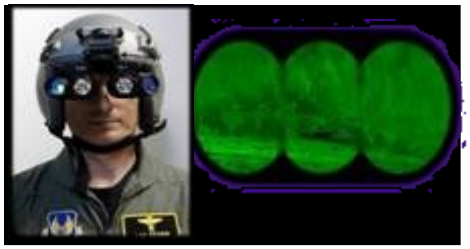
Technology for the Air Force "Concept to Combat"

6.1 Basic Research
(e.g., Bio Sciences)



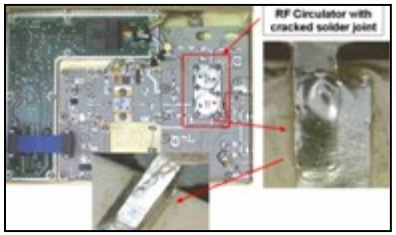
6.2 Applied Research
(e.g., Joined-Wing)

6.3 Adv Tech Demos
(e.g., Night Vision Device Training)



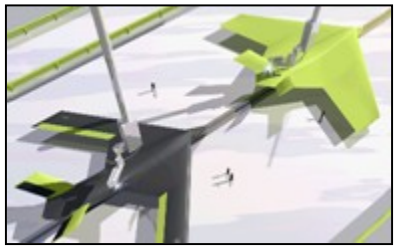
7.8 Man Tech
(e.g., PNVG – 2nd Source for Intensifier Tubes)

Full Spectrum Science and Technolog



Quick Reaction
(e.g., C-17 SKE Failure)

User Needs
(e.g., Aging Wiring Integrity)



Future Concepts
(e.g., Unitized/ Modular

Acquisition Consulting
(e.g., Boom Operator Weapon System Trainer)

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- Transforming AF S&T
- S&T Program Drivers
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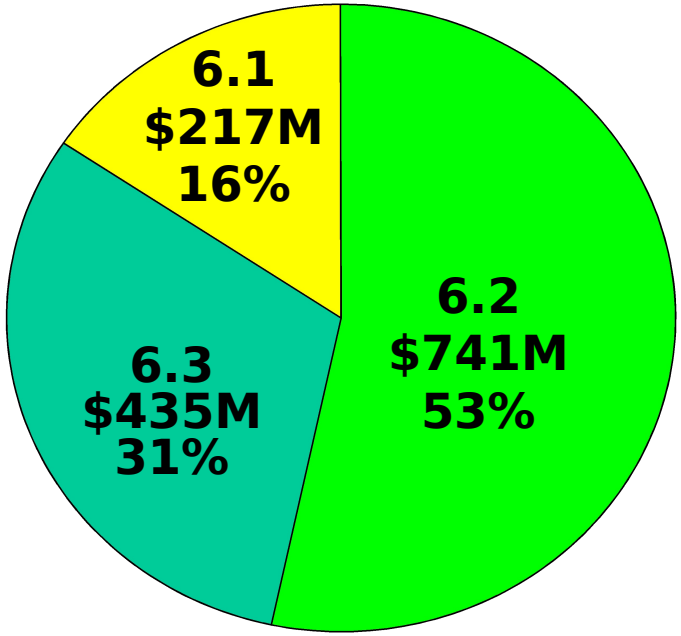
Strategic Planning Guidance – Background

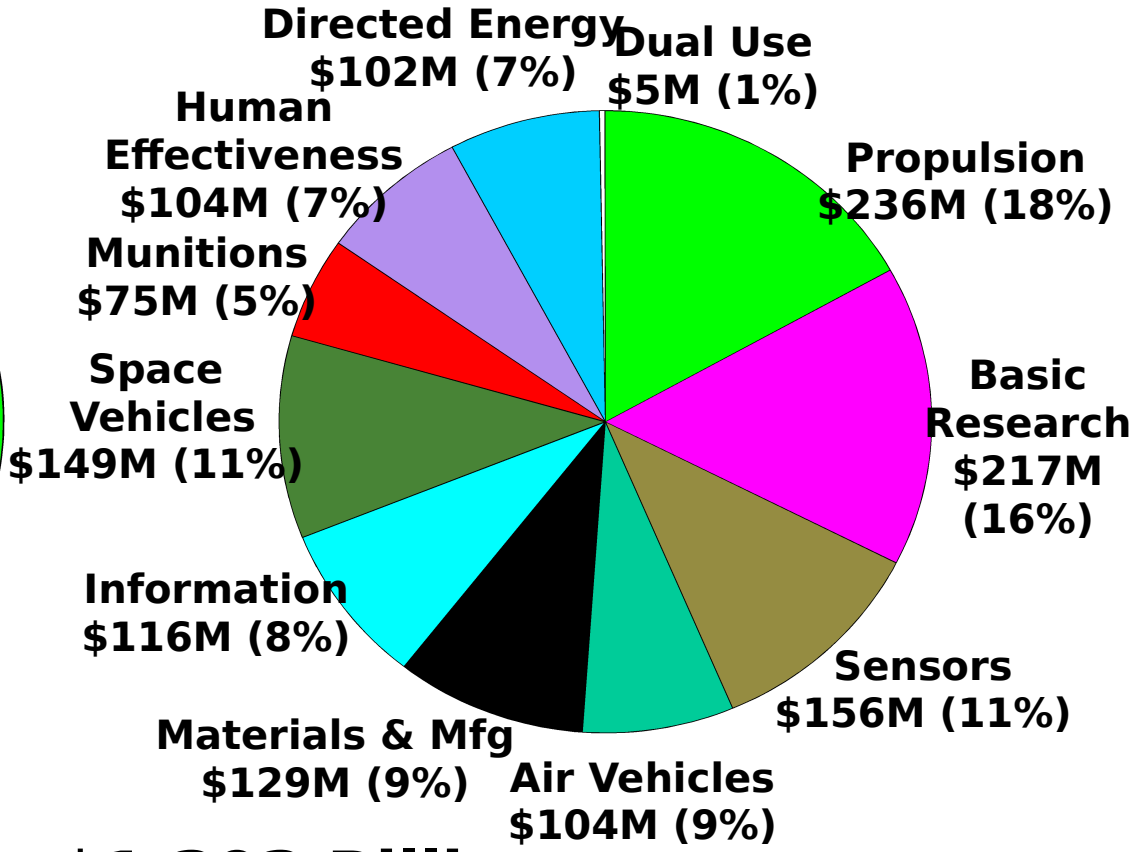
- **SPG Direction**
  - **“(U) Components will maintain or increase S&T investment at the levels programmed in the FY 2005-2009 President’s Budget FYDP for FY 2006-2009, with the goal of achieving 3 percent annual real growth.”**

FY05 President's Budget
AF S&T Budget

By Budget Activity



By Directorate/Tech Area

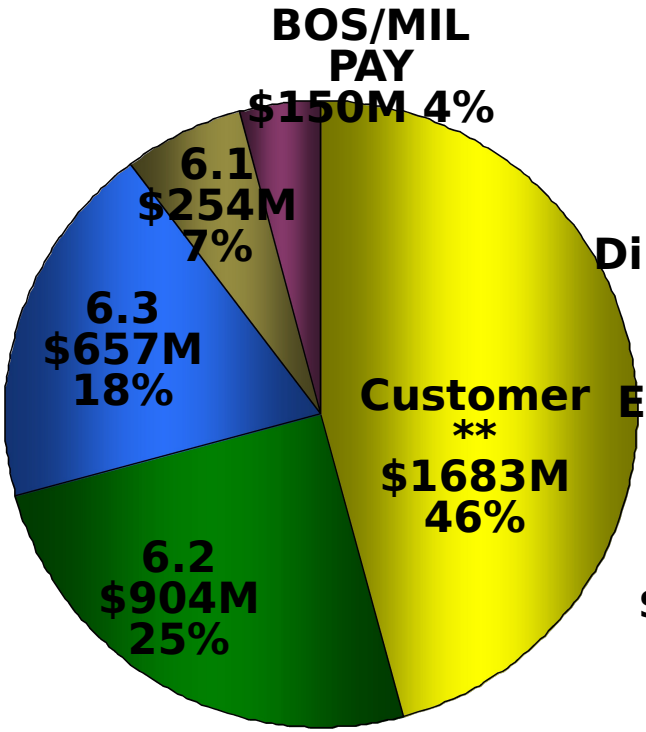


TOTAL: $1.393 Billion

Values May Not Add Due to Rounding

FY05 Total AFRL Budget

By Budget Activity



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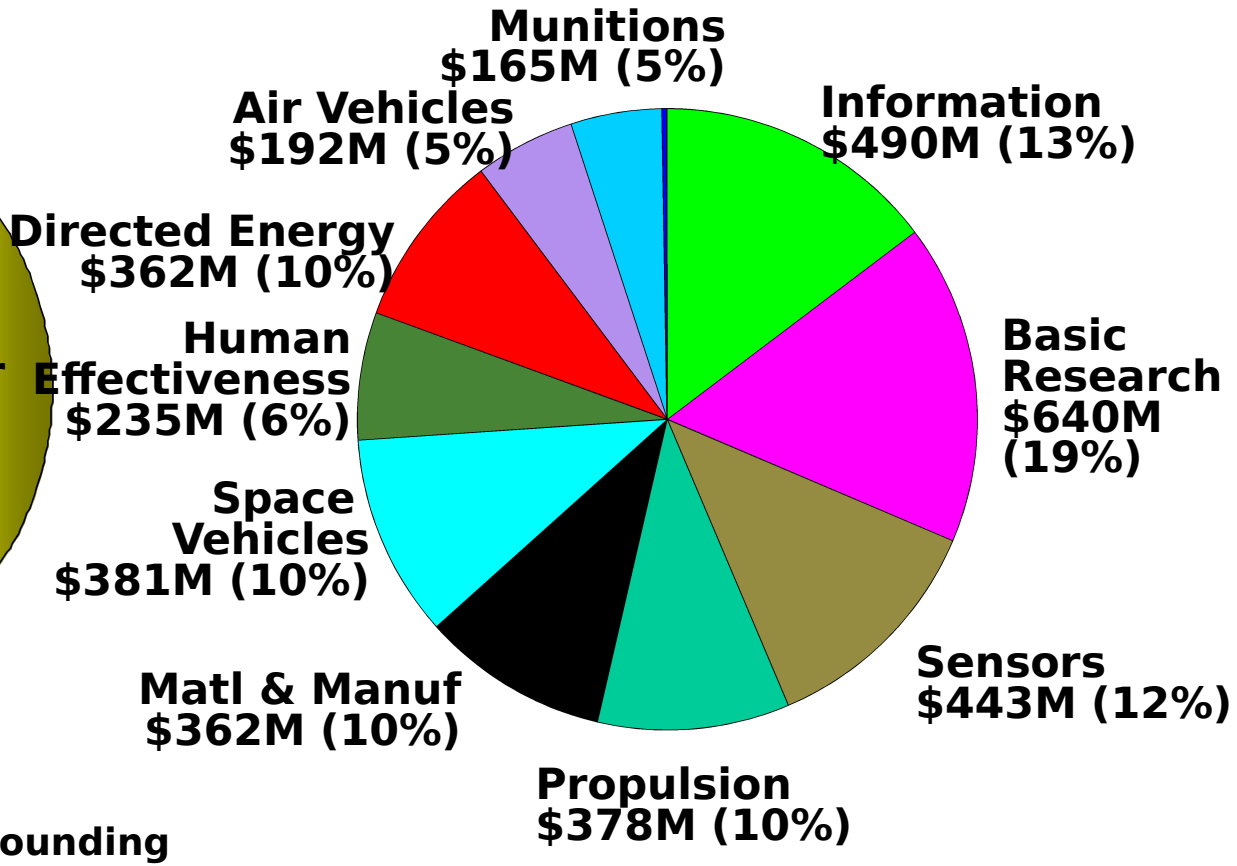


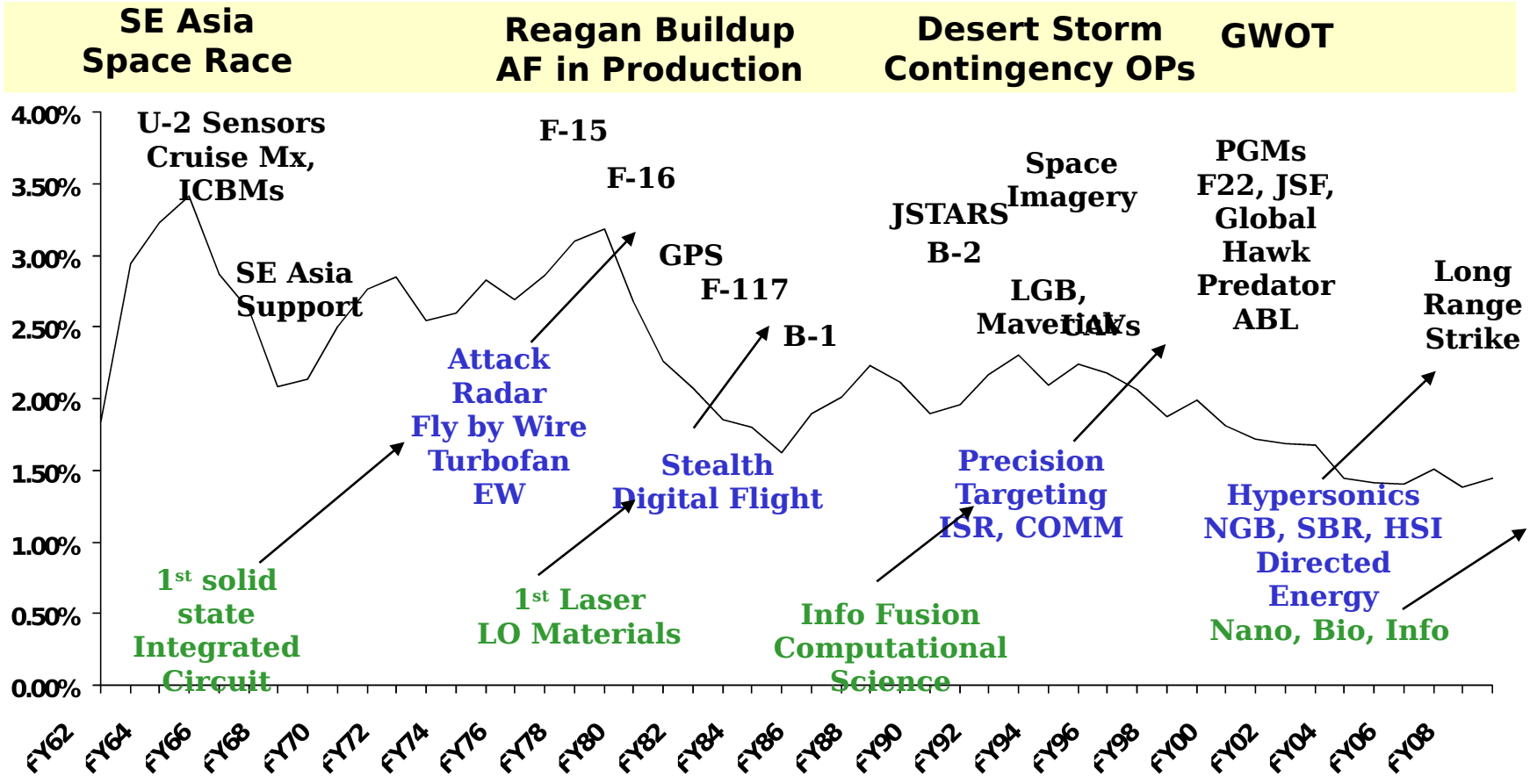
- Values May Not Add Due to Rounding
- ** Includes SBIR

TOTAL: $3.648 Billion*

As of 29 Nov 04

AF S&T AS % OF AF BLUE TOA*

FY62 THROUGH FY09



Performance → Stealth → Affordability → Multi-Function

* AF BLUE TOA excludes National Foreign Intelligence Program (NFIP), Defense Health Program (DHP), and Special Operations Com

Operating Tenets

- **Outsource majority of research/tech development to industry and academia**
- **Perform focused in-house research to maintain core expertise and be a smart outsourcer**
- **Balance near term transfer and far term research**
- **Collaborate/coordinate with others**
  - **DoD: Army, Navy, DARPA, DTRA, MDA, NRO**
  - **Other federal agencies: NASA, DOE, others**
  - **Private sector**
  - **International**

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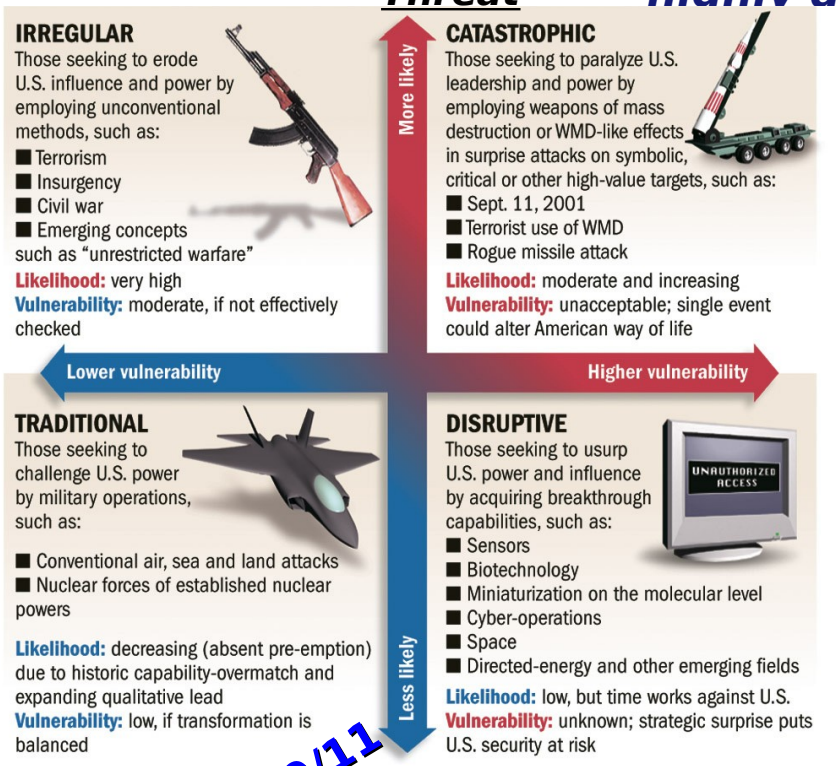
Many Changes in Global Realities Since the Creation of AFRL

The speed of modern technology and the creativity of our elusive and opportunistic adversaries makes "what we don't know"

Threat ***highly dangerous*** ***Technolog y***


IRREGULAR
Those seeking to erode U.S. influence and power by employing unconventional methods, such as:
■ Terrorism
■ Insurgency
■ Civil war
■ Emerging concepts such as "unrestricted warfare"
Likelihood: very high
Vulnerability: moderate, if not effectively checked
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Vulnerability: unknown; strategic surprise puts U.S. security at risk
Less likely
UNAUTHORIZED ACCESS

What we don't know we know ***(missed opportunities)***	***What we don't know we don't know*** ***(most dangerous)***
What we know we know	***What we know we don't know***

"Global Situational Awareness"

"Speed & Agility"

Post 9/11 National Security New Challenges

"One out of a Million" Threat Environment

Cyber / Info Ops Gap

Lean Defense Budgets

The World Has Changed…

In An Environment of Change AFRL Must Have a Clear Site Picture of What Our Customers Need

Who are Our Customers and What Do They Want?

- **AF Senior Leadership**
  - Technology ideas that shape future concepts
  - Tech push to show operators what's possible
- **Program Managers (Capability Developers)**
  - Transitionable technology options
  - Core S&T connected to operational AF needs via CRRA "requirements pull"
- **Capability Users and Decision Makers**
  - Responsive technology solutions
  - Unprecedented innovation to meet urgent needs

Three discrete:

- Customers
- Timelines
- Outputs
- Relationships

Today's Lab has one work structure to se[illegible] customers

Attributes of the Envisioned Future

oneAFRL

- Consistently anticipate and proactively adapt to an uncertain future
- A valued AF team member – *leading innovative, integrated, and multidisciplinary*:
  - Long-term research, driven by an audacious technology goal – *shape the future Air Force*
  - Development of technology options that meet the needs of capability developers – *deliver on our commitments*
  - Technology response to urgent needs – *provide rapid, come-as-you-are solutions*
- Grow technology leaders for the AF
- Access and exploit all of mankind's S&T knowledge
- Establish and fully leverage strategic partnerships
- Operate with sound enterprise business principles

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Gen Jumper's "Sight Picture"

(Air Force Chief of Staff)

Concepts of Operations (CONOPS) … will guide our planning and programming, requirements

…Air Staff designed a new review to replace the 'Quarterly Acquisition Review Program'-- we call this new (process) approach a Capabilities Review and Risk Assessment (CRRA).

CHIEF'S SIGHT PICTURE:
Capabilities Review and Risk Assessment

What happened to the Quarterly Acquisition Review Program (QAPR)? In this Sigh Picture, I'll answer that question--but to do so, I first need to give you a sense of the bigger picture in which the answer fits.

The Air Staff is currently working hard to lay the foundation for the next step in our transformation to a capabilities-focused Expeditionary Air and Space Force. Our goal is to warfighting effects, and the capabilities we need to achieve them, the drivers for everything

the development of new Task Force C

our planning and programming, requirements

ed seven Task Force CONOPS that we are fleshing out--Global Str (GSTF) is a prominent example and is the farthest along in development.

It's in this context the Air Staff has designed a new review to replace the QAPR--we this new approach a Capabilities Review and Risk Assessment (CRRA). The focus of th view to a review of ho effects. As with all aspects of our transform Force CONOPS.

me briefly describe the logic behind the CRRA construct. For our first time out chute, we'll review the capabilities that support the GSTF. The CRRA will evaluate th health and risk of each of the required GSTF capabilities over the next 20 years. To accomp this, we will review acquisition programs and discuss disconnects and prioritization in relati how the programs support GSTF capabilities. The bottom-line goal for the CRRA is to give senior USAF leadership an operational, capabilities-based focus for acquisition program decisionmaking.

The target for the GSTF CRRA is June 2002. As future Task Force CONOPS are defined, we will hold CRRAs accordingly. SAF/AQ and AF/XO will lead us through this first cycle, with major input from the MAJCOMs. Much work needs to be done through the next four months to make this a successful review, and I need your support so our Air Force can move in the right direction--towards using operational warfighting effects as the origin for every piece of hardware and software we buy.

…make warfighting effects, and the capabilities we need to achieve them, the drivers for everything we

… shift from a program review to a review of how our programs contribute to warfighting capabilities and effects.

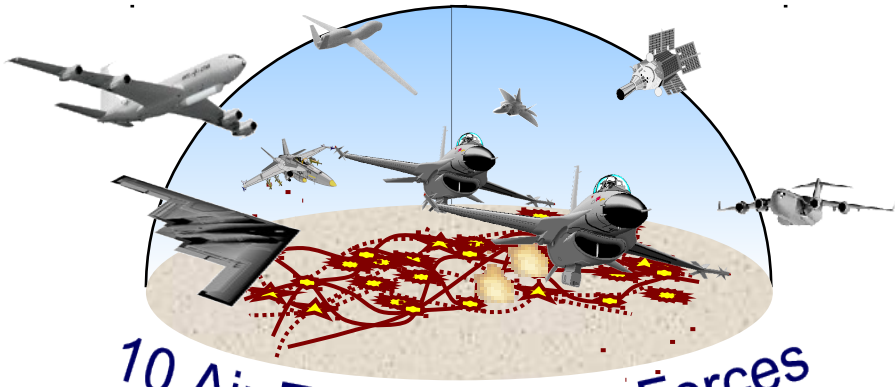
AF Capabilities–Based Planning

National Strategies

SECDEF Planning Guidance

Joint Concepts

Planning



Joint Integrated Capability is the absolute requirement. To be effective, you must be able to "plug and play"

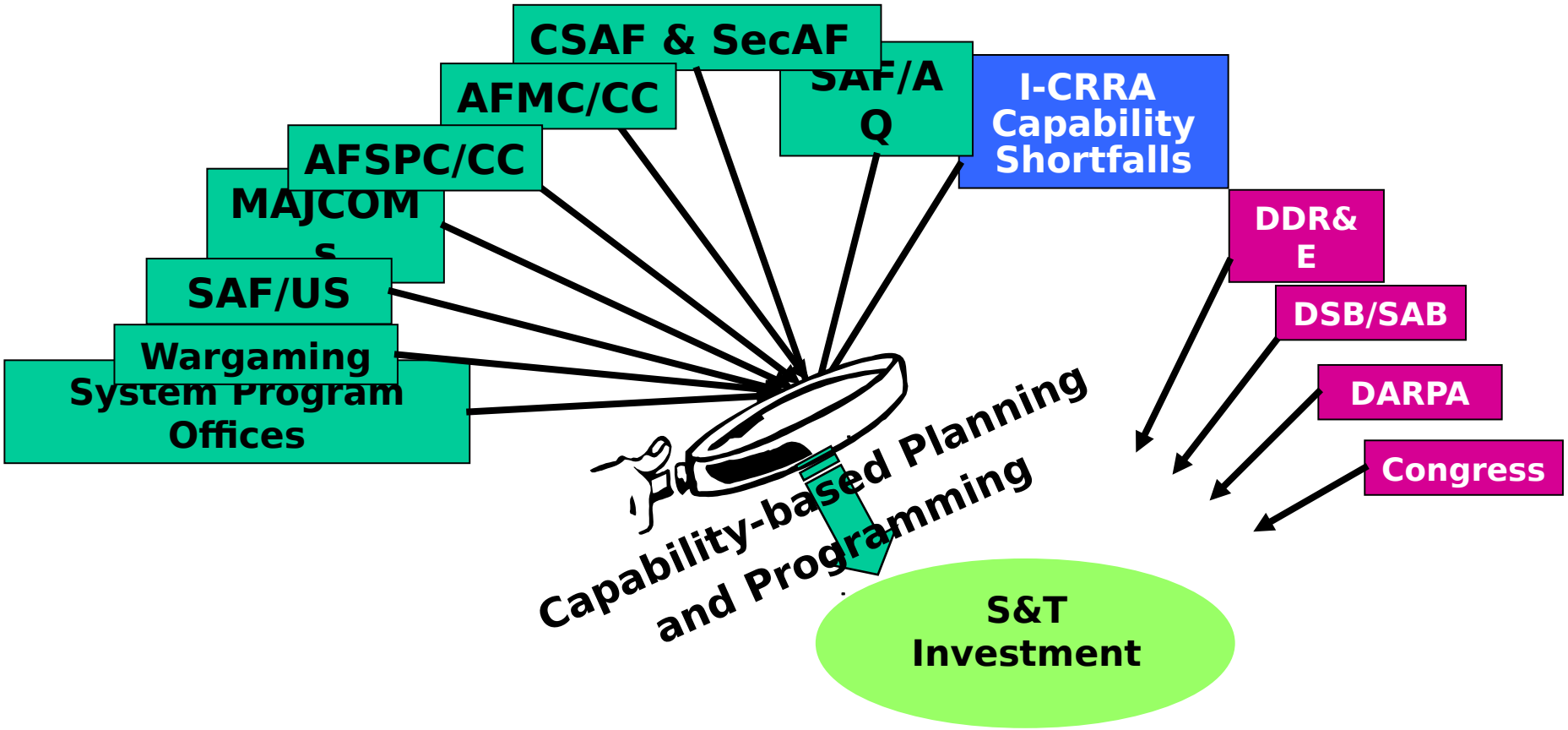
Programming
Budgeting
Execution

Integrated Capability Review and Risk Assessment (I-RA)

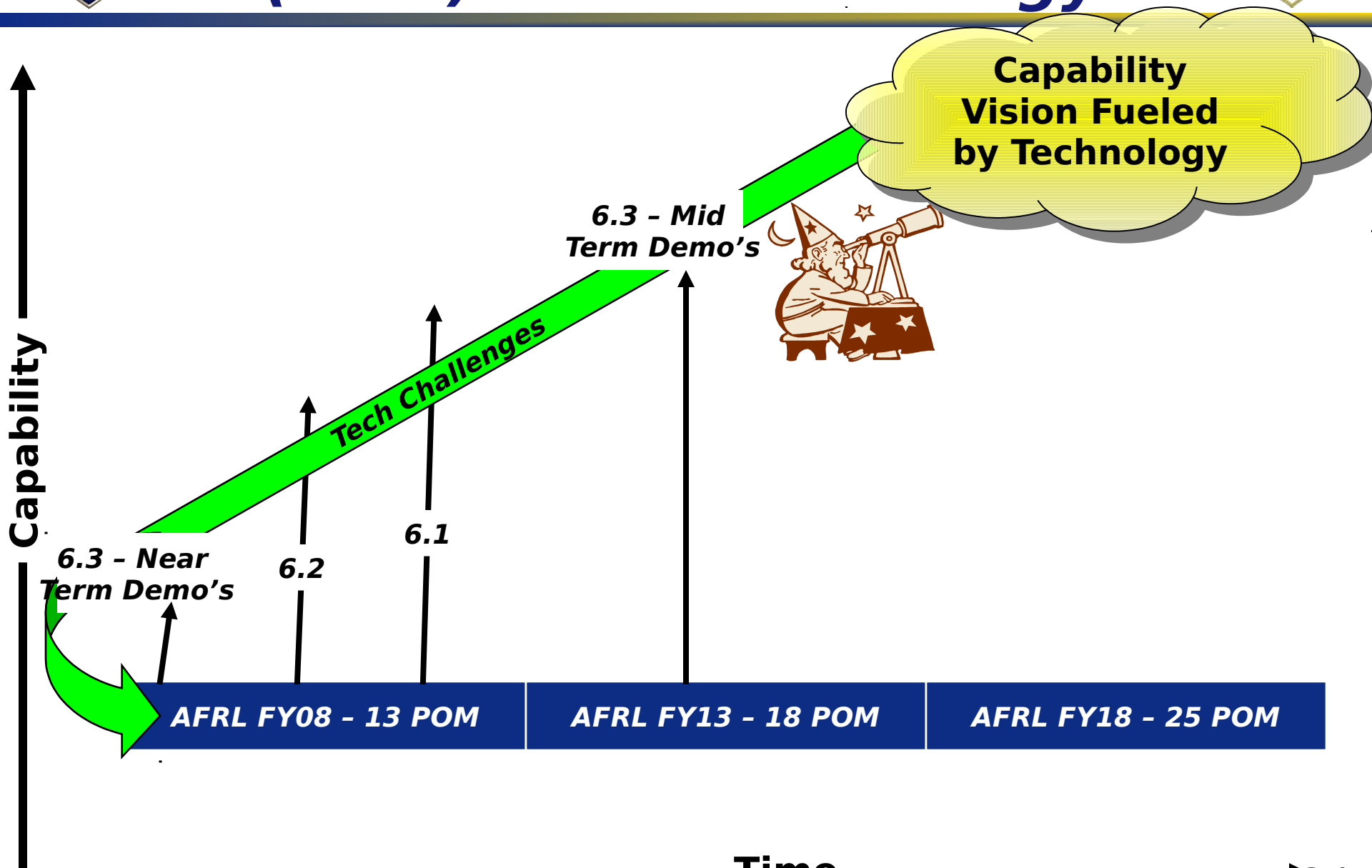
Global Strike CONOPS	Homeland Security CONOPS	Global Mobility CONOPS	Global Persistent Attack	Nuclear Response CONOPS	Space & C4ISR CONOP

Agile Combat Support CONOPS

S&T Investment Development

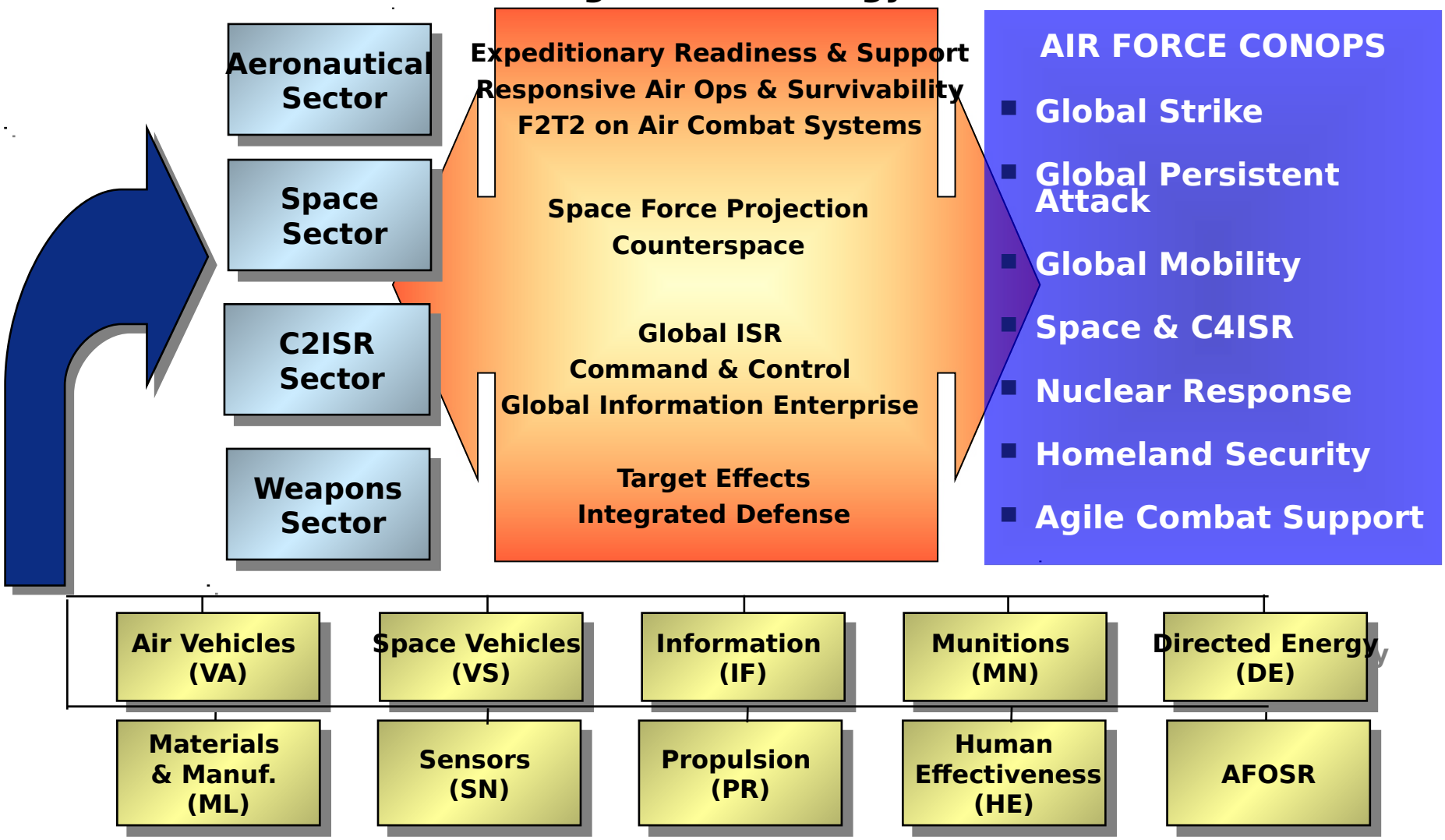


Focused Long Term Challenge (FLTC) Problem Strategy



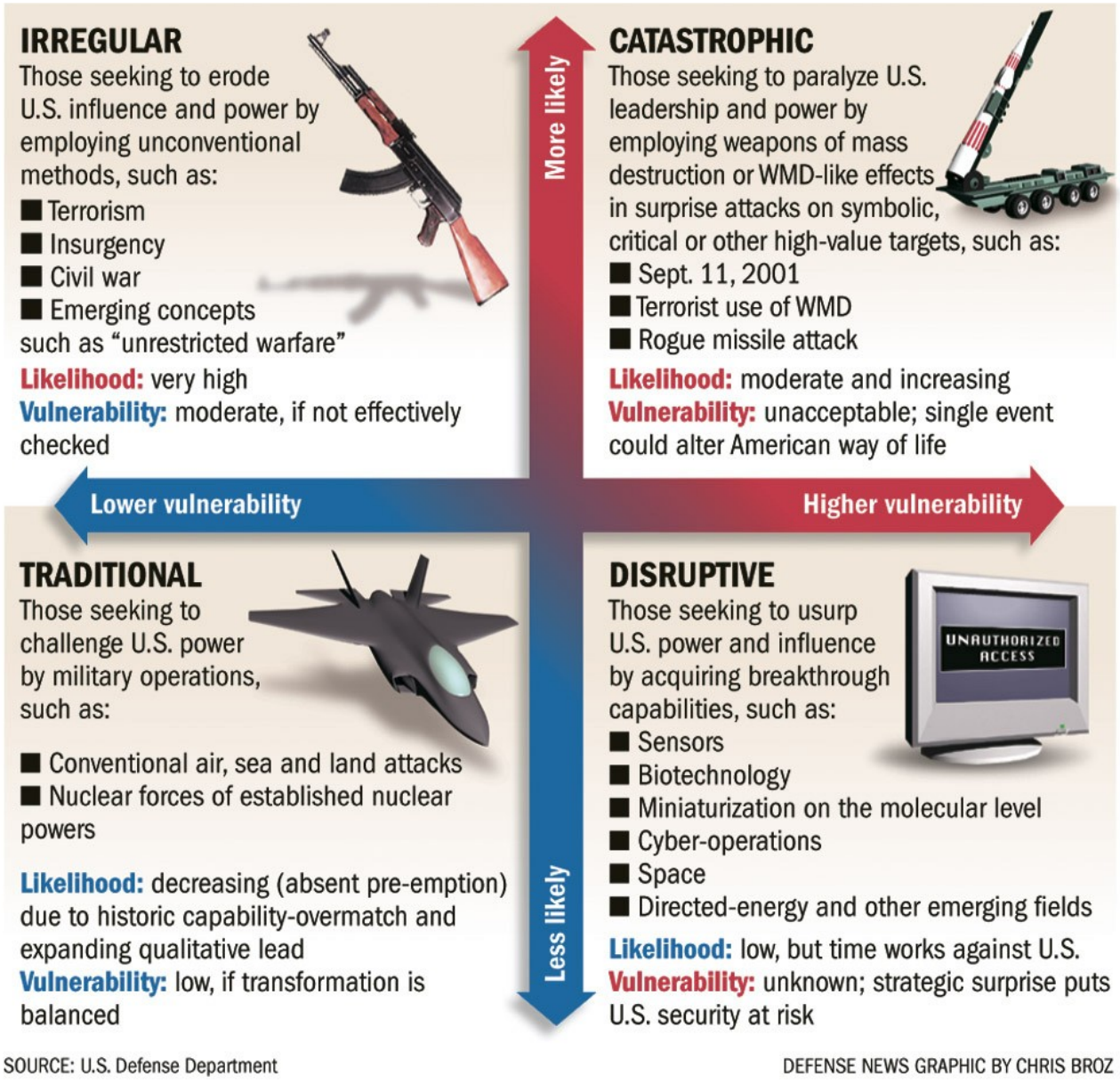
Sector Focus
Technology to Capability to CONOPS

Warfighter Technology Areas



Changing the Plot

- **For decades the Pentagon's war plans focused on countering conventional military threats.**
- **New planning scenarios focus on preparing for a wider range of contingencies**
- **To migrate from Traditional to other areas requires *Revolutionary Technology Enablers***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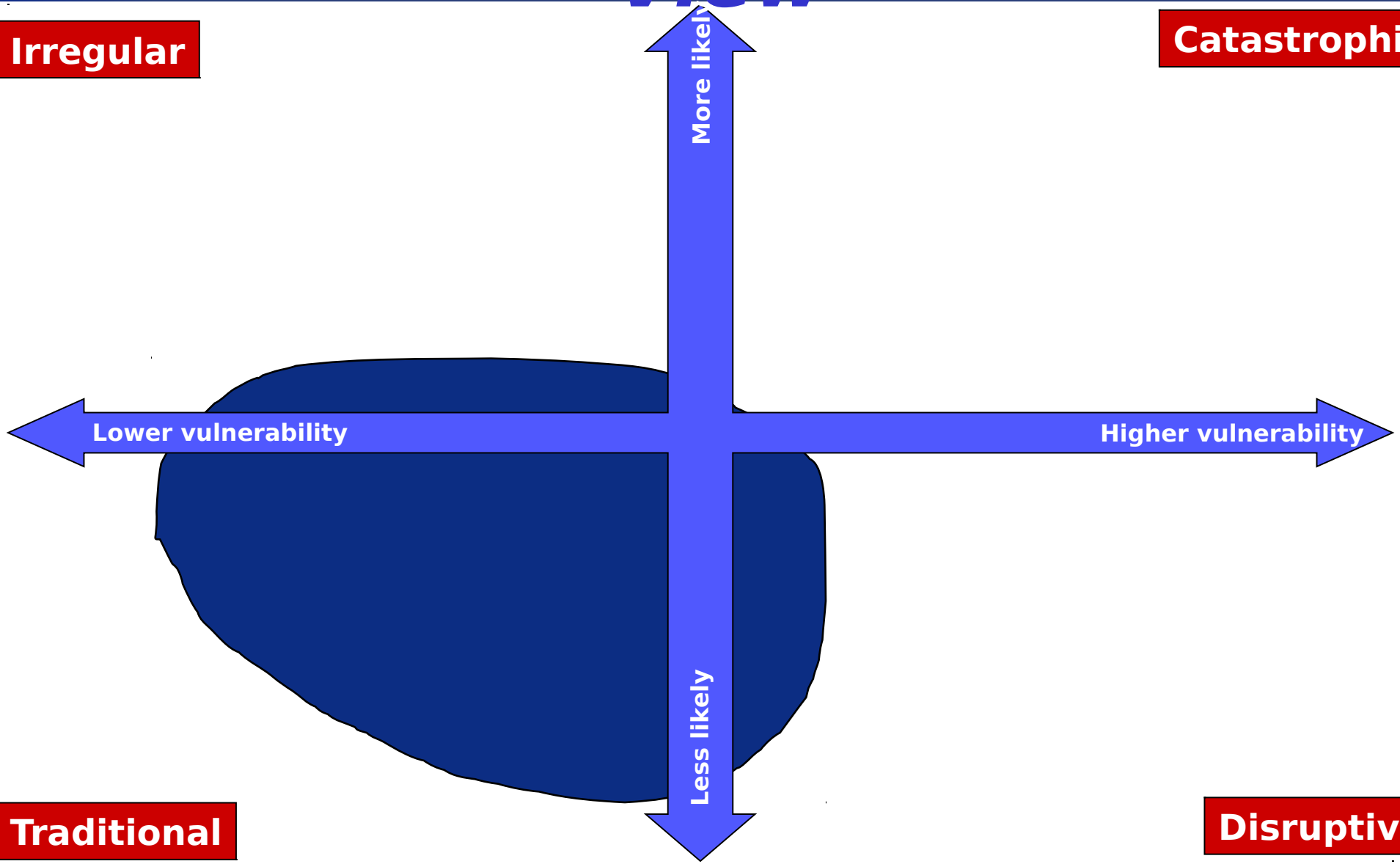
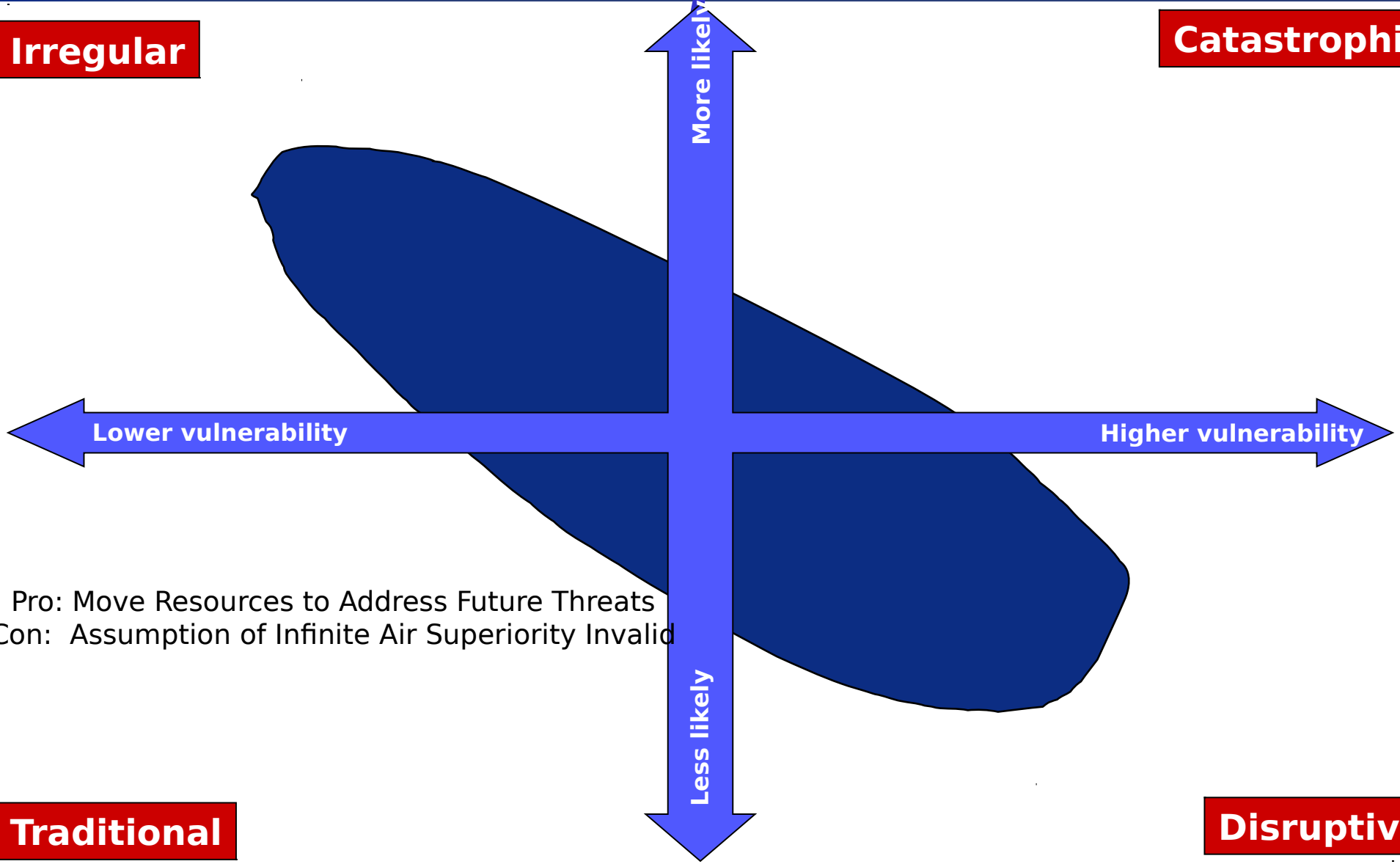
Vulnerability: unknown; strategic surprise puts U.S. security at risk
UNAUTHORIZED ACCESS
Less likely
SOURCE: U.S. Defense Department
DEFENSE NEWS GRAPHIC BY CHRIS BROZ

USAF Coverage – Current View

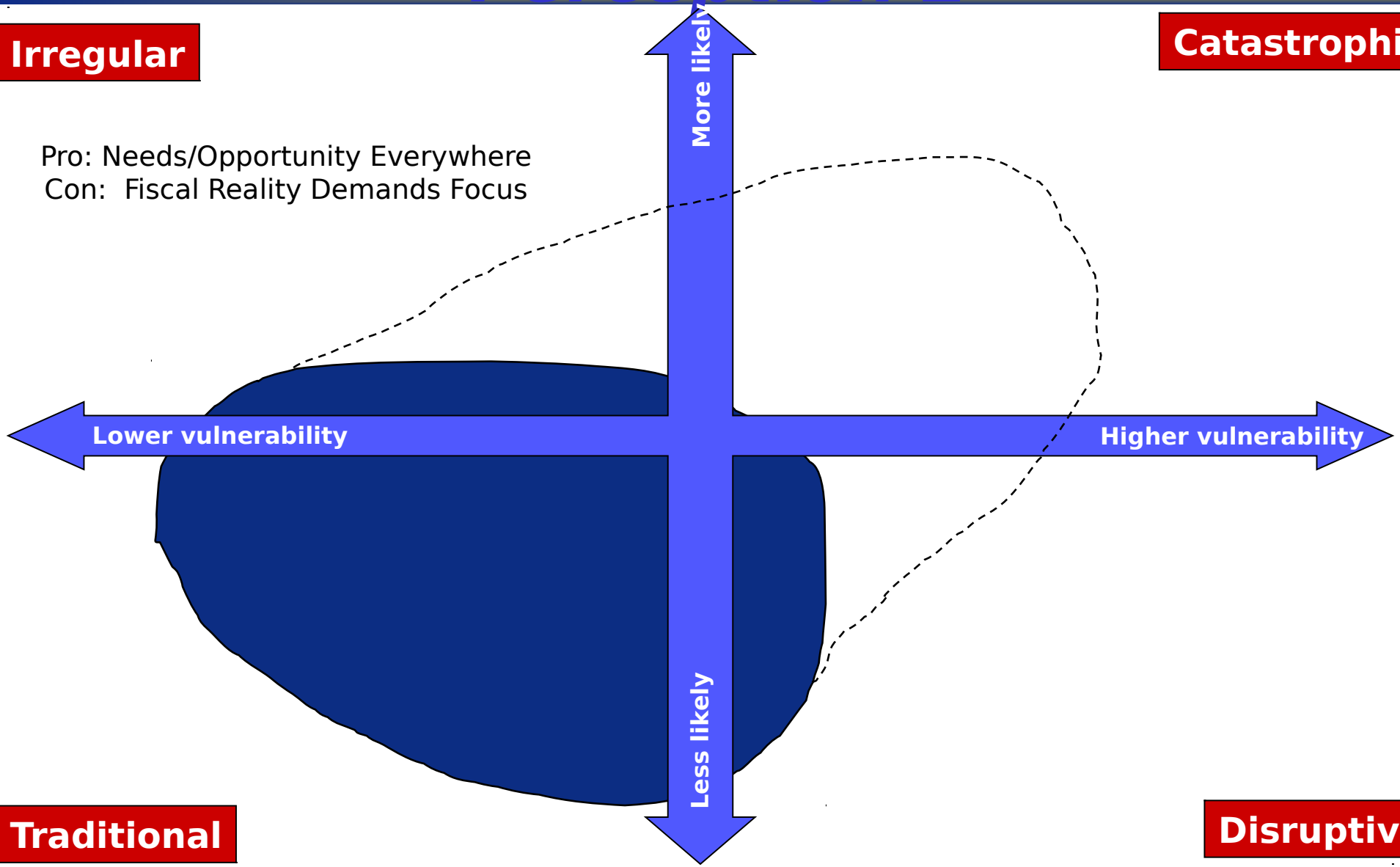


Future USAF Coverage – Perception 1

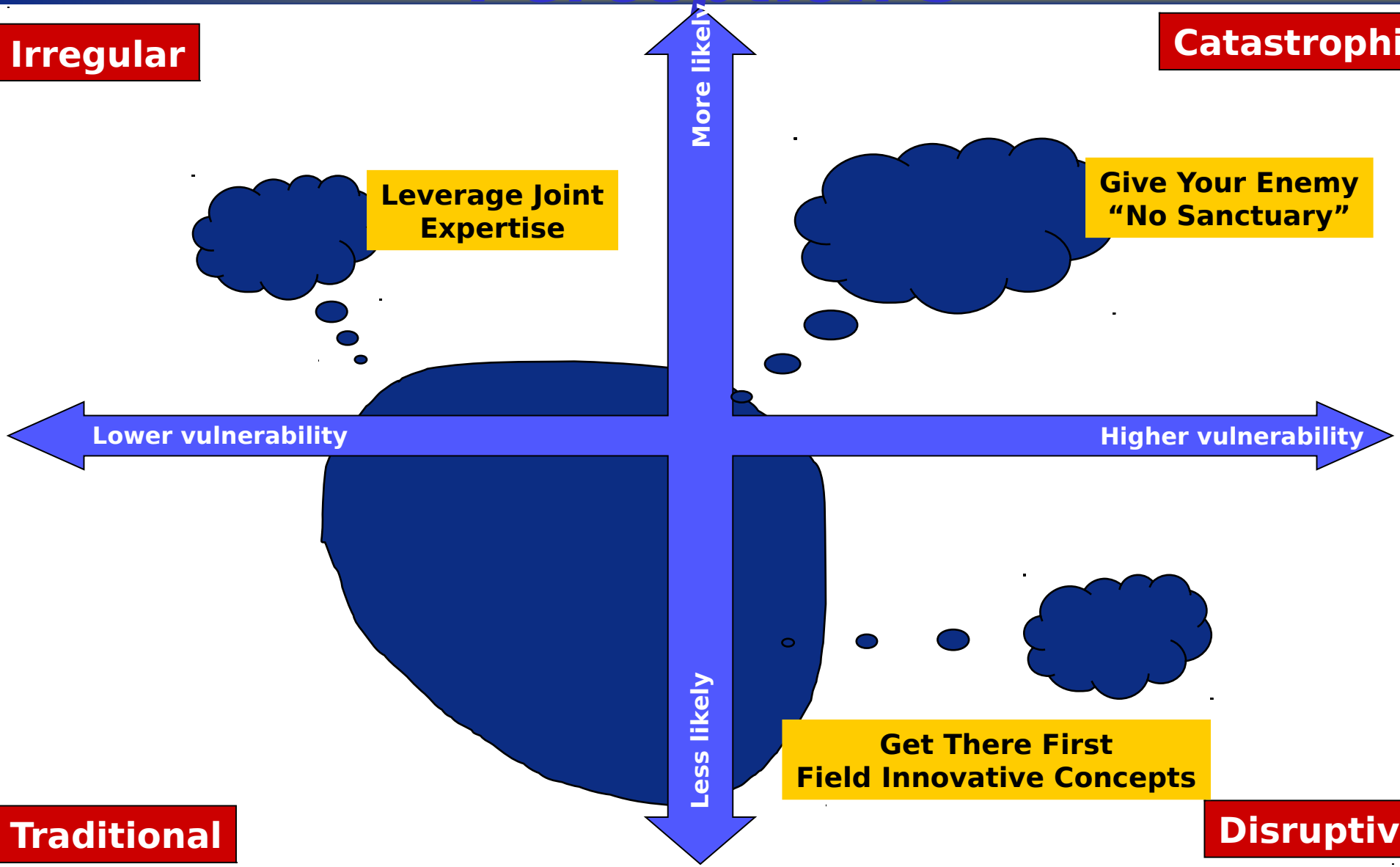


Pro: Move Resources to Address Future Threats
Con: Assumption of Infinite Air Superiority Invalid

Future USAF Coverage – Perception 2



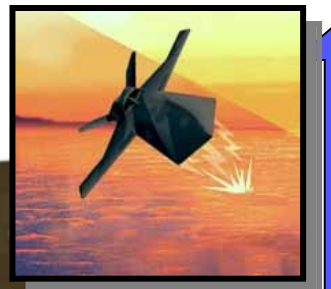
Future USAF Coverage – Perception 3



Technology Enablers

Irregular

Catastrophi



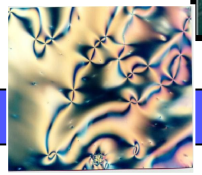
High Power Microwaves

More likely

Single Stage to Orbit

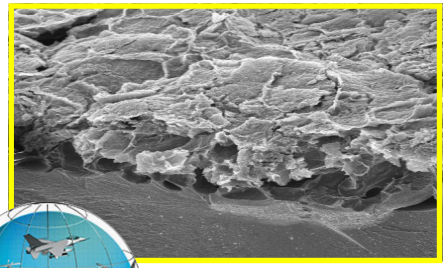
Lower vulnerability

Higher vulnerability

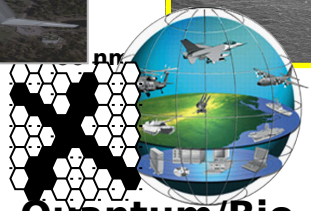


Nano ChemBio

Self-Healing Materials



Less likely



Quantum/Bio Computing –

Traditional

Disruptiv

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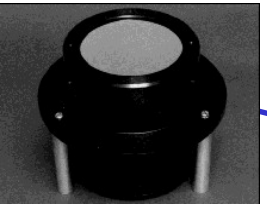
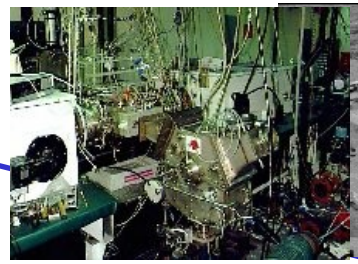
Increase Multi-Disciplinary Solutions



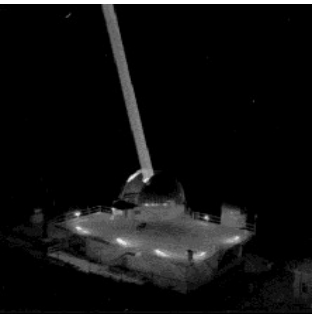
Adaptive Optics



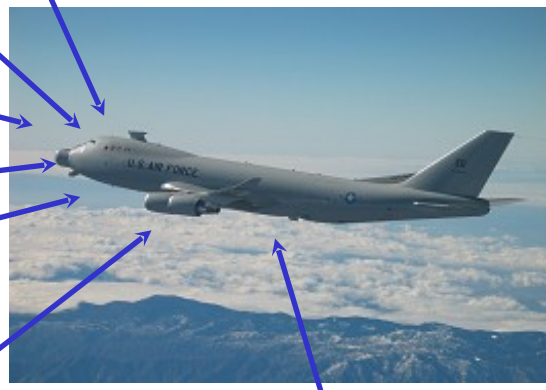
Chemical Oxygen Iodine Laser

Airborne Laser Laboratory

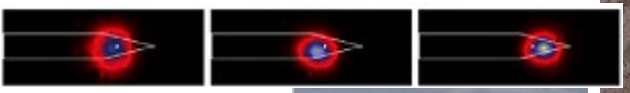
30+ Years of Air Force S&T investments in beam control and high energy lasers have made an ABL Possible



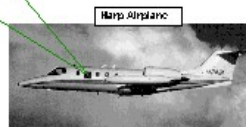
1.5m Telescope



3.5m Telescope



Atmospheric Compensation

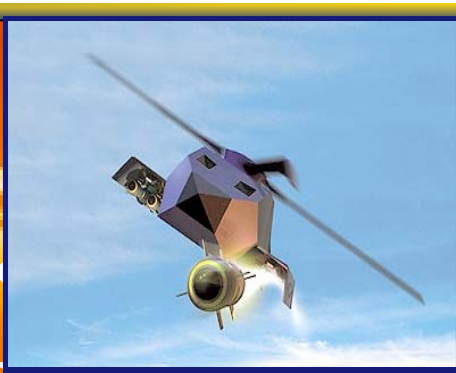


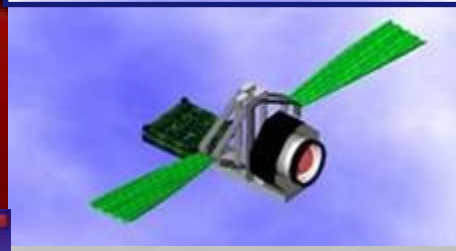
Atmospheric Measurements

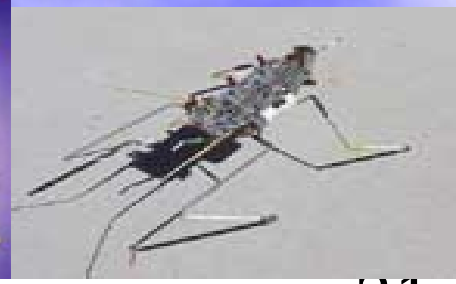
On the Horizon S&T for Special Operations

REVOLUTIONARY TECHNOLOGY

- Directed Energy
- Next Generation Gunship S&T
- Power
- Fabrication
- Micro-Munitions
- Micro-Communicati
- Micro-Sensors
- Counter-Proliferatic
- Reasoning Logic
- Quality Assurance
- Analytic Toolkit

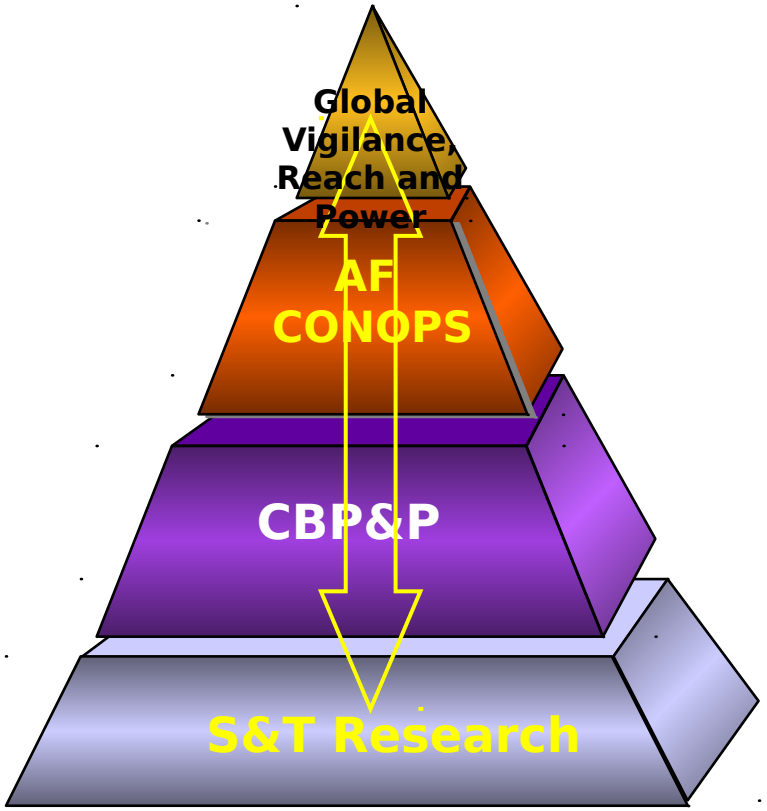






Summary

- Special Partnerships exists between AFRL and industry
  - Industry is a “supplier” and a “customer”
- AFRL driven by Capability Based Planning
  - I-CRRA defines tech pull
  - AFRL defines tech push
  - Industry needs to speak the same language
- Changing “nature of warfare” is driving future
  - Irregular/catastrophic/traditional/ disruptive
  - AFRL is changing investments in response
  - New DoD directions will impact Industry



QUESTIONS
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Defending America by unleashing the
power of innovative science and technology